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Abstract

LATTICE STUDIES AND CRITICAL EXPERIMENTS IN LIGHT WATER MODERATED SYSTEMS

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This paper reviews the status of reactor physics relating to slightly enriched uranium-water moderated reactor systems. An evaluation is made of the theories and experiments which have been reported by various laboratories in the United States. For purposes of simplicity the paper is limited primarily to heterogeneous reactor systems containing but a single region.

Published reports from the following laboratories have been considered for review: Argonne National Laboratory, Babcock and Wilcox, Bettis Atomic Power Laboratory (Westinghouse), Brookhaven National Laboratory, General Electric (Vallecitos), General Electric (Hanford), and Westinghouse Atomic Power Division.

In general, the paper deals with the measurement of reactor parameters and comparisons of the experimental results with theoretical calculations. Some of the following parameters are considered for review: buckling, eigenvalues, resonance capture, fast fission, thermal neutron distributions, thermal neutron spectrum, and dk/dB^2. In particular, the development of both theoretical and experimental techniques since the Second Geneva Conference (1958) is discussed. Certain experimental techniques such as the small lattice experiments, the variable loading method in exponential assemblies, and resonance capture techniques are reviewed. In addition, some references are given to work at B & W related to lattices containing U-235 and thorium, and to work at BNL on lattices containing U-233 and thorium.

Some typical results are given within the text of the paper while references to the complete works are listed in the bibliography.